



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/894,375	06/27/2001	Leonard Nanis	NANS 1000-2	5531

22470 7590 06/12/2003

HAYNES BEFFEL & WOLFELD LLP  
P O BOX 366  
HALF MOON BAY, CA 94019

EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 06/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
09/894,375

Applicant(s)  
Nanis

Examiner  
Rodney McDonald

Art Unit  
1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Apr 30, 2003
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above, claim(s) 15-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2,3 6) ☐ Other:

Art Unit: 1753

## DETAILED ACTION

### *Election/Restriction*

1. Applicant's election with traverse of Group I, claims 1-14, in Paper No. 5 is acknowledged. The traversal is on the ground(s) that one would not utilize sputtering to build up a thick layer of Ni-P because it is expensive. This is not found persuasive because one could utilize sputtering to build up a layer of Ni-P even though it is expensive.

The requirement is still deemed proper and is therefore made FINAL.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-7, 9, 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Pat. 6,316,097).

Liu et al. teach *a magnetic recording media including an alternative substrate material having a Young's Modulus greater than that of Al-based substrate materials and a preselected average surface roughness (Ra) are formed by depositing a continuous, adherent, non-magnetic, catalytically active layer on a surface of the substrate and electrolessly plating an amorphous seed layer on the catalytically active layer*, the Ra of the resultant surface of the

Art Unit: 1753

amorphous seed layer being reduced from that of the substrate, thereby providing a substantially defect-free surface for deposition thereon of magnetic recording media layers thereon.

*Embodiments include sputter depositing an catalytically active layer of Ni--Al or Ni--P and electrolessly plating an amorphous seed layer of Ni--P thereon. (See Abstract)*

According to embodiments of the present invention, *the substrate comprises a material selected from glass, glass-ceramics, ceramics, and metal ceramic composites; step (a) comprises depositing, by a physical vapor deposition (PVD), chemical vapor deposition (CVD), or a plasma-enhanced chemical vapor deposition (PECVD) process, a continuous, catalytically active layer comprising a metal selected from the group consisting of nickel (Ni), palladium (Pd), titanium (Ti), aluminum (Al), zinc (Zn), copper (Cu), and alloys and compounds thereof with non-metals; and step (b) comprises electrolessly plating an amorphous seed layer comprising a material selected from Ni--P alloys with phosphorus (P) content in the range of from about 10 to about 13.5 wt. %, optionally followed by polishing of the Ni--P amorphous seed layer. (Column 5 lines 11-25)*

According to further embodiments of the present invention, *step (a) comprises sputter depositing a catalytically active layer of Ni-Al or Ni--P about 50 to about 5,000 Angstroms thick and further includes first depositing an adhesion layer comprising a metal, metal alloy, or ceramic layer on the substrate surface prior to depositing the catalytically active layer. (Column 5 lines 26-32)*

Art Unit: 1753

According to a still further embodiment of the present invention, the method comprises the further steps of: © depositing a magnetic recording layer over the amorphous seed layer; and (d) forming a protective overcoat layer over the magnetic recording layer. (Column 5 lines 33-38)

According to another aspect of the present invention, a method of manufacturing a magnetic recording media comprises the sequential steps of: *(a) providing a disk-shaped substrate comprising a material having a Young's modulus greater than that of Al and its alloys and a surface with a preselected Ra; (b) depositing a continuous, adherent, non-magnetic, catalytically active layer on the substrate surface by a PVD process, the catalytically active layer comprising a metal selected from Ni, Pd, Ti, Al, Zn, Cu, and alloys and compounds thereof with non-metals; and © electrolessly plating a seed layer of amorphous Ni--P on the catalytically active layer*, the Ra of the resultant surface of the amorphous Ni--P seed layer being reduced from the preselected Ra of the substrate surface, and providing a substantially defect-free surface for deposition thereon of layers comprising the magnetic medium layer(s). (Column 5 lines 39-57)

In some instances, *an adhesion promoting layer 22A may be first deposited over substrate surface 21 prior to depositing catalytically active layer 22 thereon. Such adhesion promoting layer 22A may be from about 10 to about 100 Angstroms thick, typically about 30 to about 40 Angstroms thick, and comprise a metal such as Cr or Ti and alloys thereof, or alumina (Al<sub>2</sub>O<sub>3</sub>) or other ceramic material.* (Column 8 lines 22-28)

Art Unit: 1753

***A suitable PVD technique for depositing each of the catalytically active and adhesion promoting layers is cathode sputtering,*** either DC or RF activated, depending upon the electrical conductivity of the sputtering target. By way of illustration, but not limitation, suitable continuous, adherent, catalytically active layers 22 comprising Ni--Al alloys or Ni--P (P=15-25 at %) compounds may be deposited by DC magnetron sputtering of similarly composed targets at a power density of about 0.5 kW/in.sup.2, an Ar pressure of about 10 mTorr, and a substrate temperature of about 100.degree. C. (Column 8 lines 31-38)

In the next step according to the present invention, substrate 20 with continuous, catalytically active layer 22 formed on surface 21 is immersed in an ***electroless plating bath of the type conventionally utilized for forming amorphous plating layers on Al-based magnetic recording medium substrates.*** (Column 8 lines 39-44)

***Alternatively, the need for polishing of the electrolessly-plated Ni--P amorphous seed layer may be eliminated by utilizing smooth substrate blanks (i.e., Ra<100 Angstroms), in which case processing may proceed directly to texturing or media layer deposition.*** (Column 9 lines 8-12)

The differences between Liu et al. and the present claims is the roughness is not discussed and the masking of the chemical and mechanical variations is not discussed.

As to the roughness Liu et al. teach utilizing substrate blanks with an average roughness less than 100 Angstroms therefore the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior

Art Unit: 1753

art's range which is within the range of applicant's claims because it has been held to be obvious to select a value in a known range by optimization for the best results, see *In re Aller*, et al., 105 U.S.P.Q. 233.

As to the masking of the chemical and mechanical variations, the binder layer provides a defect free surface and therefore masks the underlying variations. (Column 4 lines 16-17)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Liu et al. by selecting the appropriate roughness for the substrate and to have masked the variations of the substrate as taught by Liu et al. because it allows for forming defect free surfaces for depositing subsequent layers thereupon.

4. Claims 1, 2, 4-11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Tada et al. (U.S. Pat. 6,123,603).

Nanis teach in accordance with the present invention, FIG. 3, *the aluminum alloy substrate (disk)* is first degreased by organic solvents, as in the prior art. The substrate is then moved into a vacuum sputtering system designated by the dotted block. Vacuum sputter deposition systems are well known. Suffice to say that in such systems the substrate is placed in an evacuated enclosure for processing. The first step is to further clean the surface by reverse sputter etching. In accordance with an embodiment of the invention, *a first layer 16, FIG. 4, of material selected to bind with the aluminum surface is vacuum sputter deposited onto the surface. This is followed by vacuum sputter depositing a second layer 17 which serves as the nucleating layer for the subsequent electroless plating of a Ni-P layer.* (Column 4 lines 47-61)

Art Unit: 1753

Pure chromium and pure titanium are preferred for the binder layer materials.  
Zirconium, vanadium, niobium, molybdenum, tantalum, tungsten and rhenium as well as  
alloy combinations of these elements may also be vacuum sputter deposited onto the  
aluminum disk as a first layer. The first (binder) layer covers the aluminum alloy and  
imbedded inclusions equally. This prevents the different behavior of these regions as occurs in  
the prior art process which relies on wet chemical processing only. (Column 4 lines 62-68;  
Column 5 lines 1-3)

The second vacuum sputter deposited thin layer is selected to: 1. bond tightly to the  
first layer; 2. further cover over inclusions; 3. resist oxidation during storage; 4. be insoluble  
in the electroless nickel solution; 5. nucleate the growth of electroless nickel; 6. bond tightly  
with electroless nickel; and 7. be nonmagnetic or selected that it does not interfere with the  
magnetic field produced by the read-write head. (Column 5 lines 4-11)

The most important requirements are the ability to nucleate Ni-P plating upon  
immersion in the electroless nickel bath and to provide non-magnetic behavior. Pure nickel is  
an effective nucleating layer and, if the aluminum alloy surface is smooth, the growth of  
Ni-P will continue as a smooth surface. (Column 5 lines 12-17)

Although field calculations show that magnetic nickel may be used as the second layer,  
other non-magnetic materials may be deposited to nucleate Ni-P and satisfy all other  
requirements. Alloys of nickel mixed with amounts of alloy element sufficient to depress the  
Curie temperature to room temperature or below are suitable. (Column 5 lines 24-30)



Art Unit: 1753

*Pure copper is non-magnetic and nucleates Ni-P growth from electroless nickel baths containing chloride ion and it also nucleates nickel-boron alloy from electroless nickel baths containing amino borane. Copper is thus an alternate second layer material. Pure palladium and pure platinum are also non-magnetic and can nucleate Ni-P deposition, and are suitable second layer materials. Alloy mixtures of nickel and copper are resistant to oxidation, as are also pure palladium and platinum, permitting storage without degradation of the surface after sputter deposition but before immersion in the electroless nickel tank. Alloys of copper with palladium and of copper with platinum are also suitable for the second layer. The Cu-Pd and Cu-Pt alloys may range within wide composition limits. Ternary mixtures of Cu, Pt and Pd in all proportions are also suitable second layer materials. In addition to palladium and platinum, second layer materials are pure gold, pure rhodium, pure osmium, pure ruthenium and pure rhenium. Alloys of said non-magnetic and Ni-P nucleating pure elements are also useful in binary combinations or multi-element mixtures over a substantially broad range of compositions.* (Column 5 lines 39-61)

The remaining steps of the process are shown in FIG. 3 and are identical to the steps followed in the prior art FIG. 2. *Wet chemical addition of Ni-P deposit is followed by polishing and the vacuum sputter deposition at chromium, magnetic cobalt alloy and carbon.* (Column 6 lines 48-52)

As discussed and described above, *the first and second layers cover the chemical non-uniformities and block their tendency to produce localized growth in advance of the main*

Art Unit: 1753

*Ni--P deposit.* In this way, the chemistry of the aluminum alloy has no effect on subsequent Ni--P deposition. Since the process covers over the chemical and metallurgical differences in the aluminum alloy, it may be possible to use less expensive alloy grades for which special treatments to remove intermetallic forming elements are not necessary. *Also, glass, ceramic and polymeric substrates can be coated with Ni--P by this method.* For example, the first layer may be chromium and titanium of which each bonds well to both glass, ceramic and plastic polymer materials. *Other materials, such as lightweight titanium or magnesium alloys, can also be used as the substrate (disk).* (Column 6 lines 53-68)

The differences between Nanis and the present claims is the level of smoothness of the substrate is not discussed.

A magnetic hard disc substrate made of an aluminum alloy for memory devices such as a computer must correspond to an improved structure in which the interval between a head and a medium is made narrower to attain high density recording. In order to prevent head crash, it is required that the magnetic hard disc substrate have a smooth surface and decreased defects. The present invention provides a process for manufacturing a magnetic hard disc substrate made of an *aluminum alloy which satisfies the above requirements and also provides a disc substrate which has a surface roughness  $Ra \leq 0.5$  nm* and is free from abrasive flaws with a depth of 5 nm or more and from micro-waviness or provides *a disc substrate which has a surface roughness  $Ra \leq 5$  angstroms and a surface roughness  $R_{max} \leq 80$  angstroms and in which the*

Art Unit: 1753

number of scratches with a depth of 50 angstroms or more is 5 or less and the number of pits with a depth of 50 angstroms or less is 5 or less in the surface. (See abstract)

After achieving the polished substrate subsequent steps such as Ni-P plating can take place. (Column 2 lines 53-54)

The motivation for utilizing a polished smoothness of a substrate less than 30 angstroms in average roughness is that it allows for achieving high density recording. (Column 2 lines 26-30)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nanis by utilizing a polished smoothness of the substrate less than 30 angstroms as taught by Tada et al. because it allows for achieving high density recording.

5. Claims 1, 4-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (U.S. Pat. 5,980,997) in view of Tada et al. (U.S. Pat. 6,123,603).

Ross et al. teach a method in accordance with my invention comprises the step of depositing a smooth metallic layer on a glass substrate and texturing the metallic layer with a laser beam. The metallic layer is preferably impact resistant, hard and has a high melting temperature (e.g., greater than 1000.degree. C.). (Column 2 lines 11-16)

In a first embodiment, *a metallic initiation layer is deposited on the glass substrate followed by electroless plating of NiP onto the initiation layer. The initiation layer is a material which facilitates electroless plating of NiP, such as Zn, Pd, Co, Fe, Rh, Be, NiP, Ni or alloys thereof.* The initiation layer is formed because it is not possible to electroless plate NiP

Art Unit: 1753

directly onto glass. After electroless plating, the NiP layer is then polished and laser textured.

(Column 2 lines 17-24)

During one process in accordance with the first embodiment, *the initiation layer is a thin Zn layer, and is formed by a zincate process. During this process, Al is deposited on the glass substrate, e.g. by sputtering, evaporation or other method. Thereafter, the substrate is subjected to the zincate process to form the Zn layer on the Al layer (the Al layer is typically either partly or completely consumed during the zincate process). A NiP layer is then plated onto the thin Zn layer, e.g. by electroless plating.* The NiP layer is then polished and laser textured. Of importance, the thin Zn layer facilitates electroless plating of NiP, and the Al layer facilitates the formation of the Zn layer by the zincate process. (The zincate process does not work on bare glass.) In lieu of Al, other materials which can be subjected to a zincate process, e.g. Mg, can be used. (Column 2 lines 25-39)

In one variation of the first embodiment, *an adhesion layer is deposited, e.g. by sputtering, on the glass substrate prior to depositing the Al layer.* The adhesion layer causes the Al layer to strongly adhere to the substrate. *The adhesion layer is typically Cr, Ta, Mo, W, V, Nb or alloys thereof.* (Column 2 lines 40-44)

In a second embodiment, *instead of using a Zn layer formed by the zincate process as the initiation layer, the initiation layer is formed on the substrate (or adhesion layer) by another process, e.g. sputtering or evaporation. The NiP layer is then formed on the substrate by electroless plating.* (Column 2 lines 45-49)

Art Unit: 1753

Referring to FIG. 1A, a disk 110 includes a glass substrate 112, ***a Cr adhesion layer 114 and an Al layer 116*** ***Substrate 112 is typically chemically strengthened borosilicate glass.*** Cr adhesion layer 114 is typically 5 to 50 nm thick (in one embodiment it is 20 nm thick) and is formed by sputtering at a rate of 4 nm/second at a power of 1 kw and a pressure of 6.5 mtorr in argon. In one embodiment, an Intevac 250 A sputtering system (manufactured by Intevac of Santa Clara, CA) is used to D.C. magnetron sputter layers 114 and 116. Al layer 116 is typically 50 to 500 nm thick (in one embodiment 200 nm thick) and is also formed by sputtering, at a rate of 6.3 nm/second at a power of 1 kw and a pressure of 10 mtorr in argon. Cr layer 114 is optional, and is provided to ensure that subsequently deposited layers strongly adhere to glass substrate 112. Al layer 116 facilitates a subsequent zincate process. (Column 4 lines 40-55)

***Referring to FIG. 1B, disk 110 is subjected to a zincate process, e.g. as described in the above-incorporated Lowenheim reference, to form a Zn initiation layer 117. Zn initiation layer 117 is typically about 5 to 10 nm thick. During this process, Al layer 116 is partially or completely consumed, depending on its thickness.*** (Column 4 lines 56-61)

In one embodiment, the substrate is subjected to a first zincate process, the resulting Zn layer is stripped off by dilute nitric and sulfuric acids, the substrate is subjected to a second zincate process, the resulting Zn layer is stripped off, and then the substrate is subjected to a third zincate process. These process steps result in formation of an improved NiP film (formed in a subsequent plating process, described below) with a finer NiP nodule structure, and a smoother NiP surface, but it is not presently clear why this is. In other embodiments, the zincate process is

Art Unit: 1753

only performed twice. In yet other embodiments, the zincate process is only performed once.

(Column 4 lines 62-68; Column 5 lines 1-6)

Referring to FIG. 1C, *NiP layer 118 is deposited to a thickness between 5 and 10 microns, and typically about 8 microns, by electroless plating.* (Column 5 lines 7-10)

*In lieu of Cr as adhesion layer 114, other materials can be used, e.g. Ta, Mo, W, V or Nb, or alloy thereof.* Alternatively, adhesion layer 114 can be omitted. (Column 6 lines 46-48)

*In lieu of borosilicate glass, other glass compositions or materials such as silicon, SiC, ceramic, glass ceramic, or sintered carbon can be used as substrate 112.* (Column 6 lines 54-56)

FIG. 3 illustrates a magnetic disk 150 during a manufacturing process in accordance with a second embodiment of my invention, *including glass substrate 112 and optional Cr adhesion layer 114 as discussed above. However, in the embodiment of FIG. 3, a Zn initiation layer 115 is formed by a vacuum deposition process such as sputtering.* When formed by sputtering, Zn layer 115 can be sputtered at a rate of 24 nm/second at a power of 1 kw and a pressure of 10 mtorr in argon. Zn layer 115 is typically 60 nm thick. (Column 6 lines 59-68)

*Thereafter, NiP layer 118 is electroless plated onto Zn initiation layer 115.* (Column 7 lines 1-2)

*In lieu of Zn, other materials capable of initiating electroless plating can be used, e.g. Pd, Co, Fe, Rh, Be, NiP, Ni and alloys thereof. Such materials can be vacuum-deposited (e.g.,*

Art Unit: 1753

*by sputtering) either onto adhesion layer 114, or directly onto substrate 112.* (Column 7 lines 8-12)

The differences between Ross et al. and the present claims is that roughness of the substrate.

Tada et al. is discussed above and teach the roughness of the substrate before deposition of subsequent layers. (See Tada et al. discussed above)

The motivation for utilizing a specified roughness of the substrate is that it allows for increasing the magnetic recording density. (See Tada et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Ross et al. by utilizing a specified roughness of the substrate as taught by Tada et al. because it allows for increasing the magnetic recording density.

6. Claims 1, 3-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal (WO 94/15720) in view of Tada et al. (U.S. Pat. 6,123,603).

Agarwal teach in Fig. 2 magnetic recording media according to the present invention comprising *a non-metallic substrate 30, an adhesion layer 32, an electrically conductive plating base layer 34, a thick nickel phosphorous (NI-P) layer 36*, a ground layer 38, a magnetic layer 40, a protective layer 42 and a lubricating layer 44. (Page 5 lines 32-37; Page 6 lines 1-2)

*The substrate 30 will be composed of glass, ceramic, carbon, glass-ceramic composites, glass-carbon composites, silicon, silicon carbide, and the like.* (Page 6 lines 8-10)

Art Unit: 1753

*The adhesion layer 32 will typically be a vacuum-deposited metal layer, with suitable metals being selected from Group IVB, VB and VIB of the Periodic Table. Particularly suitable metals include chromium, titanium, tantalum, vanadium, molybdenum and the like.*

(Page 6 lines 14-18)

*The electrically conductive plating base layer 34 is next formed over the adhesion layer 32. The electrically conductive plating base layer 34 will generally be a metal and will provide an electrically conductive surface for subsequent fabrication steps. Suitable metals and alloys include Ni-P, aluminum, platinum, copper and the like. Preferably, Ni-P will be sputtered over the adhesion layer 32.* (Page 7 lines 3-11)

*In an example polished soda lime glass disks were cleaned. A 100 Angstroms thick Cr adhesion film and 300 Angstrom Ni-17 percent P plating base film were sputter deposited. Then, a Ni-P film was electroless plated to a thickness of about 1000 Angstroms. The plated film was found to have good adhesion and excellent surface quality.* (Page 9 lines 5-12)

The differences between Agarwal and the present claims is the level of surface roughness of the substrate.

Tada et al. is discussed above and teach the level of surface roughness appropriate for a substrate for future layers to be deposited thereon. (See Tada et al. discussed above)

The motivation for providing a selected surface roughness to the substrate is that it achieves high recording density. (See Tada et al. discussed above)



Art Unit: 1753

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Agarwal by selecting a roughness for the substrate as taught by Tada et al. because it allows for achieving high recording density.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M-Th from 8 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen, can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



**RODNEY G. MCDONALD**  
**PRIMARY EXAMINER**

RM

June 10, 2003